

TWO-YEAR OLD IMMUNIZATION COVERAGE SURVEY OF SOUTH CAROLINA CHILDREN 1999

The South Carolina Department of Health and Environmental Control's (DHEC) Immunization Division conducted an immunization coverage survey in order to estimate vaccination coverage levels among two-year old South Carolina children. The survey began in July, 1999, was completed in September 1999, and used a prospective, birth registry-based design.

Sampling Frame

The sampling frame consisted of 12,227 live births occurring to South Carolina residents in South Carolina, Georgia, and North Carolina during the months of January, February, and March 1997. The sampling frame excluded known deaths and adoptions.

Sample

Using one simple random sample, 600 children were selected for the survey. The names and mailing addresses for each child selected for the survey were compared with the state health department's master file of children immunized in public clinics in order to update mailing addresses where matches were found between the two files. The frame and sample were provided by DHEC's Division of Biostatistics, Office of Vital Records and Public Health Services.

Data Collection

Lists of each child's name and address, sorted by county of residence, were assigned to district staff for collection of immunization data. Immunization provider source information obtained from the DHEC PATS Immunization Registry was communicated to field staff throughout the survey.

Dates of each vaccine the child had received, the immunization provider or providers of those immunizations, birth date, sex, race, and county of residence were collected by field staff on the data collection forms. Disposition codes were also collected as a means of studying the amount of effort required to collect these data. Procedures for data collection included searching health department immunization records, physician office immunization records, immunization records on military bases, community and rural health centers, and homeless shelters, and, where immunization data remained questionable, home visits were made in an attempt to locate non-responders.

Data collection forms were batch processed for keying by an independent company and a data file was created for analysis. Coding was supervised by the Division of Epidemiology.

Preliminary data editing included the following: a review of data collection forms for all children who were not 43133 (4 DTP, 3 Polio, 1 MMR, 3 Hib, 3 HepB) series complete, correction of keying errors, resubmission of selected forms to DIS as possible recording errors, and correction of recording errors. Forty (7%) forms were suspected of having data errors, 35

(6.5%) were found to have recording or keying errors, 29 (5%) children were found to be series complete after correction of errors.

Data Analysis

Data analysis consisted of descriptive statistics about the sample and the vaccination coverage level using multiple vaccine coverage criteria. These criteria included individual (antigen) specific analysis and combined series analysis. Additional data analysis rules applied in this survey were: (1) a minimum of a 28 day interval between doses of vaccine and, (2) MMR and Varicella must have been on or after the child's first birthday, and (3) no immunizations a child received on or after his/her second birthday were counted. The data were also analyzed by WIC and Medicaid participation. Statistical Analysis Systems (SAS) was used to perform all analyses of the survey data. Data analysis was conducted by DHEC's Division of Epidemiology.

Results

Of the 600 children selected for the survey, 535 responses were collected, yielding a response rate of 89 percent. Forty-two of the 600 children (7%) were found to have moved out of state. Twelve of the 600 children (2%) could not be located during the survey period. Nine of the 600 children refused to participate. Two of the 600 children were reported as having had clinically diagnosed chicken pox disease prior to their first birthday and were not included in calculations of vaccine coverage for single antigen varicella or combined series analysis including varicella as a component. Ninety-two (17.2%) of the children received all immunizations in Health Department clinics only, 309 (57.8%) received all immunizations from sources other than DHEC, and 134 (25.1%) received immunizations from a combination of DHEC and other providers. 177 (33%) of the children participated in Medicaid and 314 (59%) participated in WIC.

Vaccination coverage survey results from identical methodologies employed in 1997 and 1998 are shown in table 1. (NOTE: In 1998 children who had had clinically diagnosed chicken pox disease prior to their first birthday were not excluded from any analysis.)

Table 1. Vaccination coverage levels among 2-year-olds* with vaccines routinely recommended for children, by vaccination and period - South Carolina, 1998 and 1999

<u>Vaccination</u>	1999		1998	
	%	(95%CI§)	%	(95%CI§)
<u>Individual</u>				
<u>DTP/DT/DTaP¶</u>				
≥3 doses	98.5%	(97.5%-99.5%)	99.6%	(99%-100%)
≥4 doses	89.9%	(87.4%-92.5%)	91.9%	(89.5%-94.2%)
<u>Polio</u>				
≥3 doses	96.3%	(94.7%-97.9%)	98.7%	(97.7%-99.6%)
<u>Hib**</u>				
≥3 doses	92.7%	(90.5%-94.9%)	94.0%	(92%-96.1%)
<u>MMR</u>				
	95.5%	(93.8%-97.3%)	94.8%	(92.9%-96.7%)
<u>Hepatitis B</u>				
≥3 doses	97.0%	(95.6%-98.5%)	99.0%	(98.2%-99.9%)
<u>Varicella</u>				
	58.3%	(54.2%-62.5%)	44.9%	(40.6%-49.2%)
<u>Combined Series</u>				
4DTP/3Polio/ 1MMR	89.1%	(86.5%-91.8%)	91.9%	(89.5%-94.2%)
3DTP/3Polio/ 1MMR /3Hib	93.8%	(91.8%-95.9%)	94.8%	(92.9%-96.7%)
4DTP/3Polio/ 1MMR /3Hib	89.0%	(86.3%-91.6%)	91.8%	(89.5%-94.2%)
4DTP/3Polio/ 1MMR /3Hib /3HB†	87.5%	(84.7%-90.3%)	91.5%	(89.1%-93.9%)
4DTP/3Polio/ 1MMR /3Hib /3HB/1Var‡	54.0%	(49.8%-58.3%)	43.7%	(39.4%-48.0%)

* Persons aged 730 days.

§ Confidence Interval.

¶ Diphtheria and tetanus toxoids and pertussis vaccine or diphtheria and tetanus toxoids vaccine.

** *Haemophilus influenza* type b conjugate vaccine.

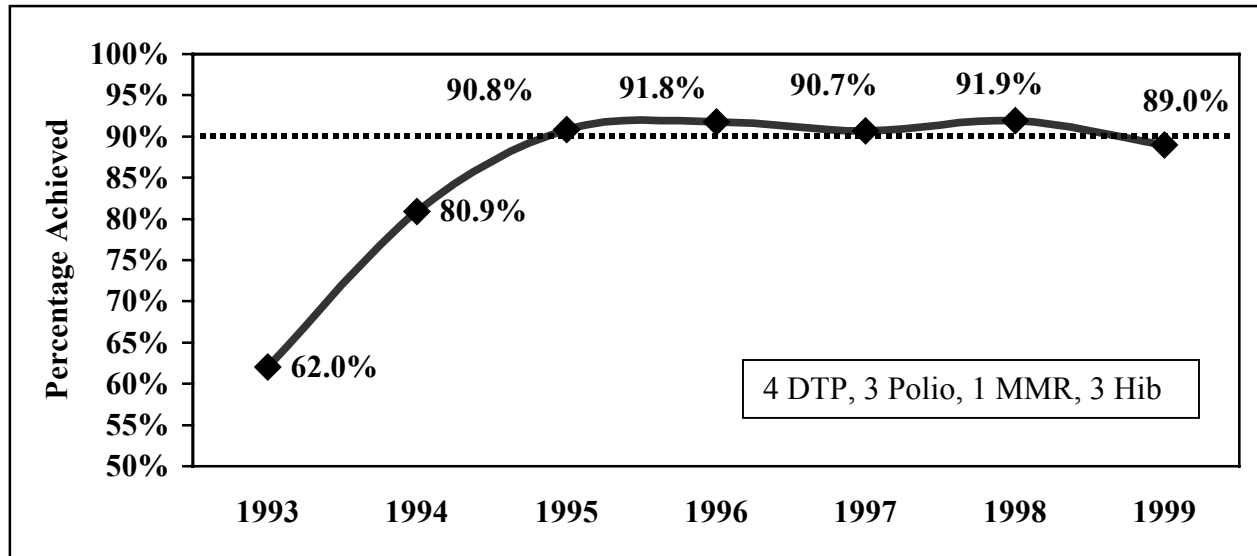
† Hepatitis B vaccine

‡ Varicella vaccines

Discussion

A graph of immunization coverage rates for in South Carolina since 1993 is shown in Table 2. The change in vaccination coverage from 91.8 percent in 1998 to 89 percent in 1999 is not statistically significant¹ and, therefore, reaffirms that South Carolina's immunization activities continue to result in high levels of protection for the state's preschool population.

TABLE 2: South Carolina Immunization Coverage Rates 1993-1999



Immunization services for preschool children continue to be offered in both public health departments and private physicians' practices throughout the state (Table 3). The vaccination coverage level for children served by DHEC only clinics increased from 91.5 percent in 1998 to 94.6 percent in 1999, and for children served by Non-DHEC only practices, the vaccination coverage level declined from 91.8 percent in 1998 to 87.7 percent in 1999 (Table 4). This pattern is also evident when rates are compared by provider type and district (Table 5). Non-DHEC practices continue to vaccinate increasing numbers of preschool children in the state while DHEC serves fewer and fewer children. While increasing medical homes for children is one positive aspect of this trend, it is also problematic that few private practices systematically assess for and recall children who are overdue for vaccinations.

¹ Two methods were employed in determining if the current value of 89% is significantly different from coverage rates found in previous years. A comparison of multiple proportions (Fliess, 1981) failed to show that the coverage rates for 1995-1999 were significantly different from each other. A comparison of 95% confidence intervals showed overlapping intervals for the years 1995-1999. A third test was also employed to determine if the 89% coverage rate was significantly different from 90% (Daniel, 1983). The test failed to show any significant difference.

TABLE 3: Percentage of Children immunized by Health Department only, Health Department and Other Providers, and other than Health Department 1997-1999

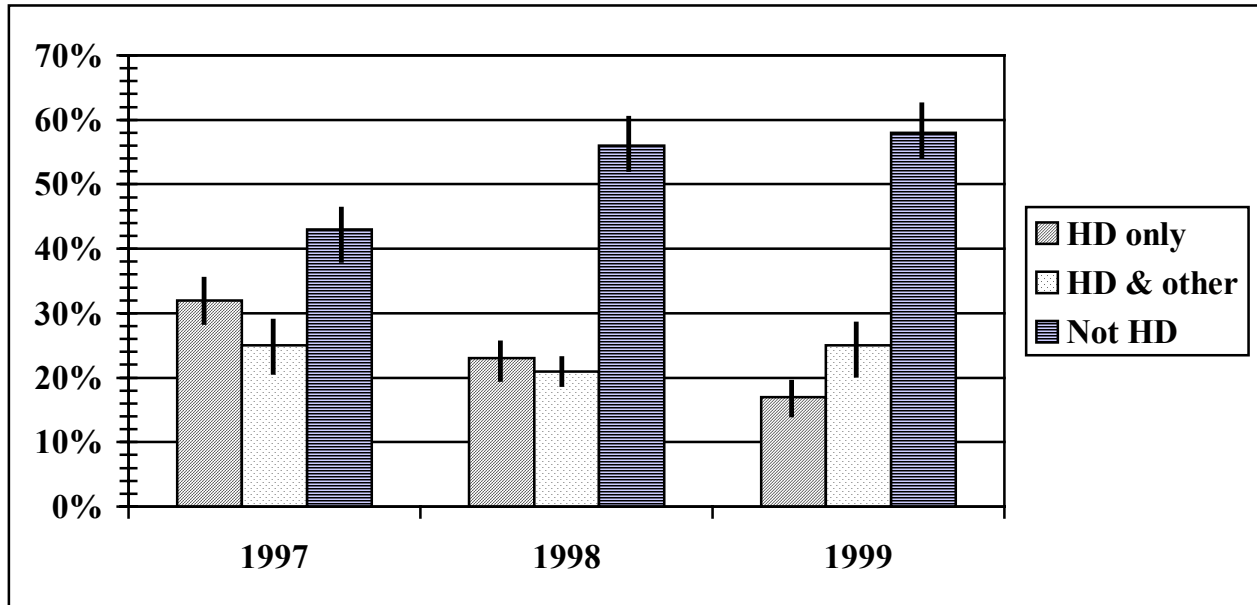


TABLE 4: South Carolina Immunization Coverage Rates by Provider Type 1998-1999

	1998	1999
Health Department Only	91.5%	94.6%
Health Department and Other Providers	92.5%	88.1%
Not Health Department	91.8%	87.7%

TABLE 5: South Carolina Immunization Coverage Rates by District and Provider Type
NOTE: Percentages are based on very small numbers, interpret with caution.

District	Health Department Only	Health Department and Other Providers	Not Health Department
Appalachia I	100%	75%	84%
Appalachia II	100%	100%	87%
Appalachia III	91%	100%	81%
Catawba	100%	82%	73%
Edisto	100%	100%	100%
Low Country	100%	100%	92%
Lower Savannah	100%	88%	92%
Palmetto	86%	74%	90%
Pee Dee	100%	85%	95%
Trident	90%	89%	84%
Upper Savannah	100%	89%	80%
Waccamaw	50%	100%	92%
Wateree	100%	80%	100%

Of the 177 children with a Medicaid number, 89.3% were 4314 (4 DTP, 3 Polio, 1 MMR, 3 Hib) series complete, while 88.8% of the 358 children without a Medicaid were 4313 series complete. 91.1% of the 314 WIC participants were series complete, while 86% of the 221 children who did not participate in WIC were series complete. (Table 6)

TABLE 6: South Carolina Immunization Coverage Rates
by WIC and Medicaid participation.

	n	number 4313 series complete	percent 4313 series complete
WIC			
participants	314	286	91.1%
non participants	221	190	86.0%
Medicaid			
participants	177	158	89.3%
non participants	358	318	88.8%

Three hundred and twenty-two (60.2%) of the children in the final sample were of white race, while 202 (37.8%) were of black race. The remaining 2% of the sample were children of Chinese, Filipino, Indian, or Other Asian race. Analysis of coverage rates by race ('white' and 'black and other') showed no statistically significant difference in coverage rates for 1999. Table 7 describes coverage rates by race since 1994.

TABLE 7: South Carolina Immunization Coverage Rates by Race 1993-1999

year	White	Black and Other	Total	p-value (χ^2)
1999	88.3%	89.4%	89.0%	0.670
1998	92.2%	91.4%	91.9%	0.758
1997	90.9%	90.4%	90.7%	0.837
1996	93.4%	89.6%	91.8%	0.109
1995	90.7%	91.1%	90.8%	0.874
1994	84.4%	76.4%	80.9%	0.022

Single antigen data for the 15 to 18 month (fourth) dose of DTP continue to demonstrate the difficulty providers have with vaccinating children before 24 months of age. Sixteen children (3%) were not series complete because they were missing the fourth dose of DTP vaccine. Nine children (2%) were not series complete because they received the fourth dose of DTP after they had reached their second birthday.

Varicella immunization was recommended in 1996. The number of two-year old children who have received the recommended one dose of varicella vaccine has increased from 44.9 percent in 1998 to 58.3 percent in 1999. Single antigen vaccination coverage levels among the state's preschool child population for all other vaccines except for the fourth dose of DTP remain above 90 percent.